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THE PETTERNS OF DYVERSITY OF FOREST VEGETATION OF THE CRVANJ MOUNTAIN IN THE HERZEGOVINA (WEST BALKAN PENINSULA)

OBRASCI BIORAZNOLIKOSTI ŠUMSKE VEGETACIJE CRVANJ PLANINE U HERCEGOVINI (ZAPADNI BALKAN)

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ABSTRACT: The peterns of structure and certain parameters of dynamics of forest vegetation have been studied along the vertical profile of the Crvanj Mt. in Hercegovina (from Ulog to Zimomor, i.e. top of mountain Crvanj). The following communities of the forest vegetation are present: Quercetum petraeae-cerris *B. Jovanović (1960) 1979 subass.* seslerietosum autumnalis *subass. nova hoc loco; Lathyro nigeri-Quercetum cerris nomen nov hoc loco (Syn.:* Quercetum cerris "mediterraneo-montanum" *Lakušić et Kutleša 1977),* Aceri-Carpinetum orientalis *Blečić et Lakušić 1966 /alliances* Quercion petraeae-cerris *[(Lakušić 1976) Lakušić et Jovanović 1980] Čarni et al. 2009 and* Carpinion orientalis *Blečić et Lakušić 1966/;* Querco- Carpinetum betuli *Horvat 1938 emend Blečić 1958 subass.* quercetosum cerris *Stefanović 1964* aposeriosum foetidae *facies nov. hoc loco (alliance* Erythronio-Carpinion *(Horvat 1958) Marinček in Mucina et al. 1993;* Lathyro verni-Fagetum sylvaticae *Redžić 2007 nom. nov (Syn.:* Fagetum moesiacae "montanum" *Blečić et Lakušić 1970),* Seslerio autumnalis-Fagetum sylvaticae *Blečić et Lakušić 1970 corr. Redžić & Barudanović hoc loco and* Phyteumo spicatae-Fagetum sylvaticae *Barudanović 2003 corr. Redžić & Barudanović hoc loco (alliance Seslerio-Fagion sylvaticae nomen nov hoc loco (Syn.:* Fagion moesiacae *Blečić et Lakušić 1970). All communities are hemicryptophitic and phanerophtic, with certain proportion of geophytes life form. The balkans, dinaric and SE Europe floral elements are with high proportion and differentiate of those forest communites from similar forest vegetation in other Dinaric Alps region.*

Key words: Balkan, Crvanj Mt., Forest vegetation, Herzegovina, Querco-Fagetea*, Syntaxonomy*

1. INTRODUCTION – Uvod

One of the basic priorities in implementation of Convention on biodiversity is protection and conservation of biodiversity on local, regional and global level. In the goal of development of measures for susteinable management, the inventarisation, categorisation, i.e. researches are recomanded as basic steps. By this action are encopassed species and habitats, as well as syntaxonomical level of biodiversity, which is extremely important indicator of ecological diversity of certain area (Lakušić & al., 1978; Redžić, 2007a; 2007b).

With objective of assessment of syntaxonomical diversity, original ecological and phytocoenological studies are performed in current investigations.

Although vegetation reserches in area of Bosnian and Hercegovinian Dinaric Alps have very long tradition (the begin of past century, Fukarek, 1954) mentioned area is still relatively unexplored in vegetation

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sense. That fact emphasize the purpose of intensive and complex phytocoenological investigations of each part of area, which is characterised with high level of heterogenity in ecological and geographycal sense.

One of the most complex unit of Dinaric Alps in region is Crvanj Mt., situated in northern part of Eastern Herzegovina.

From phytogeographical point of view, on Crvanj Mt. are hilly, mountain and subalpine vegetation belt recognized. According to Lakušić (1969), the influence of Moesian province is expressed in lower vegetation belts, while in the upper mountain and subalpine belt the influence of Illyrian province of Eurosibirian-boreoamerican region is predominant. The upper subalpine and alpine belts belong to Highdinaric province of Alpine-Highnordic region.

The position of Crvanj Mt. in the system of Dinaric Alps, relatively small distance (cca 75 km) from the sea, geologic-pedological, orographical and hydrographical conditions, in complex with other environmental factors, have esential significance in defining of ecosystem diversity on investigated area.

In past period that fact was reason for researches done by numerous naturalists and florists. Crvanj Mt. is explored by Ami Boue (in period 1836–1838); Otto Blau (19–28. of August 1871); Josef Pantocsek and Armin Knapp (Fukarek, 1954); Pichler and Formanek (Beck, 1909, Beck & al., 1967); Adamović (1889); K. Malỳ (1889; 1923); Beck (1903–1916) and Janchen (1906). The special contribution to the floristic knowledge of Crvanj Mt. gave famous Swedish botanist Svante Murbeck (Murbeck, 1891).

However, the special attention to the problem of phytocoenological diversity of Crvanj Mt. has not been paid up to current investigations. Therefore, there is no detailed published information on matter (except data conteining general distribution of certain phytocoenoses, obtained trough process of vegetation mapping).

Current investigations komprehend vegetation data, i.e. structure of different phytocoenoses allong the whole vertical profile**.** The results of investigations enclose also the hilly, mountain and subalpine meadows and pastures, rocky grasslands, alkaline peat bogs as well as submountain summer pastures (Redžić & al., 1992–94).

Here are presented results related to forest vegetation of Crvanj Mt.

The general objectives of paper are:

– Scientific knowledge of structure (floristic composition) and dynamics of prevalent forest phytocoenoses on vertical profile Ulog – Zimomor;
– Phytocoenological analysis of forest communities in the goal of susteinable planning, according to internationally accepted metodology – ecosystem approach (CBD, 1992),
– Defining of phytocoenoses and habitat types according to EUNIS (Moss & Davies, 2002),
– Phytogeographycal and syndinamical analisys with assessment of significance and dimension in relation to regional biodiversity.

2. MATERIAL AND METHODS – Materijal i metode

Phytoceonological and ecological vegetation reserches along the vertical profile of Crvanj Mt. from Ulog up to the top of mountain, were performed in different aspect in period between 1983. and 1990. The methodology of Braun-Blanguet (1964) has been entirely applied. The data of life forms and floral elements have been accepted after Oberdorfer (1983), and on endemic taxa mostly after Hayek (1924–1933). The taxa nomenclature has been given mostly after the Flora Europaea (Tutin & al., 1964–1980).

Understanding, determination and defining of certain phytocoenoses has been reconciled with the Code of phytocenologycal nomenclature (Weber & al., 2000).

Determination of humidity and thermic character of climate has been done after Gračanin (1950), and soil nomenclature after Škorić & al. (1985).

Main characteristic of investigated area – *Osnovne karakteristike istražvanog područja*

Geography and Topography: The Mt. Crvanj morphostructure is situated in Eastern Herzegovina, with geographical coordinates 43º and 43º 30’ of the north latitude and 18º and 18º 30’ of east longitude (Fig. 1). In the north it is bordered by valley of Neretva river and eastern border goes along the line Ulog – Obalj – Plužine. In the south it is bordered by Zalomka river and in the west by Nevesinje field. Mt. Crvanj settles the line north-northwest south southeast, wich is not common direction recognized in most of Dinaric Alps mountains.

Orography: According to morphology and hypsometry Mt. Crvanj can be divided in western higher part, and eastern lower part transforming into characteristic plain. The higest peak is Zimomor (1920 m). The morfostructure of Mt. Crvanj belongs to higher zone of the high karst (Vidović, 1978).

Hydrography: In hydrographic sense Crvanj Mt can be divided in nothern part, with well developed surface netting of branching directed toward Neretva river; and southern part with very poor developed surface netting /or brabching/ (Spahić, 1984).

Figure 1. Geographic position of investigated area Crvanj Mt.
Slika 1 Geografski položaj istraživanog područja planineCrvanj

In the unit of eastern part of Crvanj Mt., above Ulog, a glacial lake Ulog (known also as Lake) is situated. The water flows from lake down as Jezernica river to Neretva.

Geology and Pedology: On Crvanj Mt. could be found different types of geological foundation.On route Ulog to the top of mountain (investigated profile) marl and calcarenit is predominant, but also mixed formations of marl-sandstone, limestone, calcarenit-marl are present.

In the major part of central and high belts of Crvanj Mt. are recognized Triassic clastic scars, dolomite, limestone, Jurassic marl-sandstone limestone with particle of silicate, as well as massive and bank limestone of Jurassic and Cretaceus age.

Over mentioned geological foundation are calcomelanosol and calcocambisol, rendzine, acid calcocambisol, district cambisols and rankers developed. Subalpine in alpine vegetation belt is chsracterized by degradated calcomelanosol and rendzine, especially in wind exposed habitats where the stage of sirozem is predominant. It is expanded over wide surfaces, becomming an essential determinant of entire massive. On silicate geological foundation are soils with humus layer often degradated to the stage of silicate sirozem to.Ranker gradually traverse to distric cambisols only in characteristic carst depressions. In geological sense this area belongs to the special structural and facial unit Crvanj – Morine with the zone of Durmitor flysch (Mojčević & Tomić, 1982a, 1982b).

Ecoclimate: The Crvanj morphostructure builds one natural barriers between Adriatic and continental climate. However, the maritime influences are distinct.

Analyses of enclosed climatic diagram showes relatively distinct maritime influences in relation to distribution of rainfall (according to data from Gacko and Nevesinje climatic stations). In Kalinovik area the coninental influences are more distinct.

Humid periods are particularly present in spring and autumn. Dray period is in July and August, in the middle of vegetation season. According to data from all mentioned stations, rainfall is minimal during this period (for station Ulog recorded rainfall is only 35 mm in July). In regard to humidity, the climate is perhumid

(all stations). During the vegetation period climate is semiarid, arid and semihumid (Redžić & al., 2000).

Assessed thermic character of climate is temperate warm for stations Gacko and Nevesinje, but temperate cold for station Kalinovik. Assessed thermic character during the vegetation period is warm to teperate warm.

Relative air humidity varies between 75 to 80 % during the year. During the vegetation period it is between 58 to 76 %. The annual average of cloudiness is between 51 to 63 %. The lowest cloudiness is recorded during summer months.

According to Milosavljević (1973) investigated area is considered as moderate bright, i.e. moderate cloudy part of Bosnia and Herzegovina.

The climate of lower parts of Crvanj Mt. is mainly submontane, with more or less distinct maritime influence. Kalinovik area is characterised by montane climate, with certain level of maritime influences. Toward to the top of mountain, climate character is transformed to typical mountain, and on highest peak has certain attributes of mild alpine climate. Period of winter is temperate cold, and summer temperate warm.

According to annual isothermic maps – The climatic atlas of ex-SFRJ (Ak,1967), and temperature gradient, it has been shown that the air temperature of the highest part of Crvanj is about 2 ºC.

3. RESULTS AND DISCUSSION – Rezultati rada i diskusija

Syntaxonomical review of forest vegetation – *Sintaksonomski pregled šumske vegetacije*

QUERCO-FAGETEA Br. – Bl. & Vlieger in Vlieger 1937
QUERCETALIA PUBESCENTIS Klika 1933
(= *Quercetalia pubescentis* Br. – Bl. /1931 n.nud./1932)
Quercion petraeae – cerris [(Lakušić 1976) Lakušić & Jovanović 1980] Čarni et al. 2009
Quercetum petraeae – cerris B. Jovanović (1960)1979 *seslerietosum autumnalis* subas. nova hoc loco
EUNIS code G1.7

FAGETALIA SYLVATICAE Pawlowski in Pawłowski & al. 1928
Erythronio-Carpinion betuli (Horvat 1958) Marinček in Mucina et al. 1993
Querco – Carpinetum betuli Horvat 1938 emend. Blečić 1958 subas. *quercetosum cerris* Stefanović 1964 *aposeriosum foetidae* facies nov hoc loco
EUNIS code G1.A/P-41.24
Seslerio-Fagion sylvaticae nomen nov hoc loco (Syn.: *Fagion moesiacae* Blečić & Lakušić 1970; Incl. *Fagenion moesiacae „montanum"* B. Jovanović 1976)
Lathyro verni-Fagetum sylvaticae Redžić 2007 nom. nov
(Syn.: *Fagetum moesiacae montanum* Blečić & Lakušić 1970)
EUNIS code G1.6/P-41.1B
Seslerio autumnalis-Fagetum B. Jovanović 1976
EUNIS code G1.6/P-41.16
Phyteumo spicatae-Fagetum Barudanović 2003
(Syn.: *Aceri – Fagetum subalpinum* Fukarek & Stefanović 1958 emend. Fukarek1969)
EUNIS code G1.6/P-41.15

Review of forest phytocoenoses – Pregled šumskih fitocenoza
Class: *QUERCO-FAGETEA* Br.-Bl. & Vlieger in Vlieger 1937
Order*: QUERCETALIA PUBESCENTIS* Klika 1933
Alliance: *Quercion petraeae – cerris* [(Lakušić 1976) Lakušić & Jovanović 1980] Čarni et al. 2009
Ass.: *Quercetum petraeae – cerris* B. Jovanović (1960) 1979 *seslerietosum autumnalis* subas. nova (Nomenclature type: Releve 1, Tab.1; Diagnostic species: *Sesleria autumnalis, Helleborus odorus, Lembotropis nigricans*)

The separate vegetation belt is formed by communities of durmast and Turkey oak. It is found in the lowest part of Crvanj, from 670 m altitude going to the Lake, at SE aspect with inclination cca 30° .

Geological foundation on sites is silicate stone and limestone in series with silicates. The soil is distric cambisol where eroded humus–accumulative horizont is determined.

In the tree stratum durmast and Turkey oaks are equally present. Although communities with domination of one of mentioned species are found on certain aspect and inclination. The species of High level of significance, as diagnostic species, have: *Fraxinus ornus, Viburnum lantana, Sorbus torminalis, Quercus cerris, Acer monspessulanum, Lembotropis nigricans, Silene nutans, Verbascum nigrum, Potentilla micrantha, Helleborus multifidus, Lychnis coronaria, Sesleria autumnalis* and other (Tab. 1).

Tab. 1. Forest vegetation of Crvanj mountain in the Hercegovina region

	Plant Community	***Q.p-c***			***Q-Cb qc***				***S-Fs***		***L-Fs***				***P-F***		FREQUENCY	FLORAL ELEMENT	LIFE FORM
	Locality (co-ordinates:	Crvanj Mt			Crvanj Mt.				Crvanj Mt.		Crvanj Mt.				Crvanj Mt.				
	43 - 43 30 and 18 - 18 30)	Ulog-Jezero			Ulog.- vertical profile						High mount.-Zimomor				Zimomor				
	Altitude (m)	680	680	670	860	860	780	780	710	720	1110			1220	1500				
	Exposure	E-SE	E-SE	E	E	E	NE	NE	S	S	E-NE	E	E	W	W				
	Slope/Inclination (o)	25	25	20	10	10	25	25	35	30	35	35	25	25	20	20			
	Geological foundation	Sandstone			Limestone				Dolomite		Limestone				Limestone				
	Type of soil	Distric cambisol			Distric camb. - C.c.				Rendzine		Rend.-C.melanosol				C.melanosol				
	Size of Releve (sqm)	500	500	200	500	500	500	500	500	500	500	500	500	500	200	200			
	Coverage of vegetation (%)	85	95	95	100	100	100	100	100	100	80	100	80	100	75	100			
	Height of the trees (m) A	15	15	15	15	15	15	15	15	15	20	20	15	20	6	6			
	Height of the scrubs (m) B	3	3	2	1,5	1,5	2	3	3	2,5	2,5	2,5	3	3	1,5	1,5			
	Date	12.5. 1990	23.7. 1991	23.7. 1998	23.7. 1998	12.5. 1991	2.7. 1991	12.5. 1998	23.7. 1998	23.7. 1990.	12.5. 1998	13.5. 1998	12.5. 1998	23.7. 1998	12.5. 1998	23.7. 1990			
	Number of species	33	46	37	34	42	33	27	33	27	22	16	22	30	21	17			
	Number of releve	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
	Floristic composition																		
	Char.& Differ. species of the Ass. *Quercetum petraeae-cerris* and All. *Quercion petraeae-cerris* /(Lakušić 1976) Lakušić et Jovanović 1980/Čarni et al. 2009																		
A	Quercus cerris L.	2.2	2.3	3.3	1.1	1.1	1.1	+.1	.	.	.	.	.	.	.	.	7	Osmed	P
B	Sorbus torminalis (L.) Crantz	+.1	+.1	+.1	+.1	.	+.1	.	.	.	.	.	.	.	.	.	5	Smed	P
B	Crataegus monogyna Jacq.	1.2	1.2	1.2	.	+.1	.	.	+.2	.	.	.	.	.	.	.	5	Submed (-subatl)	P
B	Fraxinus ornus L.	1.1	1.2	1.2	.	.	.	.	+.1	+.1	.	.	.	.	.	.	5	Osmed	P
B	Quercus cerris L.	1.2	1.2	1.2	.	+.1	.	.	.	.	.	.	.	.	.	.	4	Osmed	P
B	Malus sylvestris Miller	+.1	+.1	+.1	+.1	.	.	.	.	.	.	.	.	.	.	.	4	Euras (-smed)	P
B	Lembotropis nigricans (L.) Gr.	+.2	1.2	1.1	.	.	.	.	.	.	.	.	.	.	.	.	3	Gemasskont-osmed	P
B	Viburnum lantana L.	+.1	+.2	.	.	.	+.1	.	.	.	.	.	.	.	.	.	3	Smed	P
C	Origanum vulgare L.	+.1	+.2	+.2	.	.	.	.	.	.	.	.	.	.	.	.	3	Euras-smed	H, Ch
C	Silene nutans L.	+.2	1.2	1.2	.	.	.	.	.	.	.	.	.	.	.	.	3	Euras(kont) (smed)	H
C	Verbascum nigrum L.	+.1	+.1	1.1	.	.	.	.	.	.	.	.	.	.	.	.	3	Eurassubozean	H
C	Poa nemoralis L.	+.2	1.2	1.2	.	.	.	.	.	.	.	.	.	.	.	.	3	No-euras(circ)	H
C	Hieracium cymosum L.	+.1	1.1	1.1	.	.	.	.	.	.	.	.	.	.	.	.	3	Gemasskont	H
C	Dorycnium herbaceum Vill.	+.2	+.2	+.2	.	.	.	.	.	.	.	.	.	.	.	.	3	Osmed-smed	Ch
B	Acer monspessulanum L	+.2	+.2	.	.	.	.	.	.	.	.	.	.	.	.	.	2	Smed	P
C	Helleborus multifidus Vis.	.	+.1	+.1		.	.	.	.	.	.	.	.	.	.	.	2	Balc	G(H)
C	Helleborus purpurascens W.&K.	.	+.1	+.1	.	.	.	.	.	.	.	.	.	.	.	.	2	E.C.Eur.	G(H)
C	Iris graminea L.	.	.	1.1		.	.	.	.	.	.	.	.	.	.	.	1	Smedeuropkont	G(H)
C	Lychnis coronaria (L) Desr.	.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	.	1	Osmed	H
	Char.& Differ.species of the Ass. *Querco-Carpinetum betuli* and All Erythronio-Carpinion betuli (Horvat 1958) Marinček in Mucina et al. 1993																		
A	Carpinus betulus L.	.	.	.	4.4	3.3	4.4	3.3	.	.	.	.	.	.	.	.	4	Gemasskont	P
C	Aposeris foetida (L.) Less.	.	.	.	2.3	1.1	+.2	+.2	+.2	.	.	.	.	.	+.2	.	6	(O)pralp	H
A	Acer campestre L.	.	.	.	1.1	1.1	+.1	1.1	.	.	.	.	.	.	.	.	4	Subatl-smed	P
A	Pyrus pyraster Burgds.	.	.	.	.	+.1	+.1	1.1	.	.	.	.	.	.	.	.	3	Smed (gemaskont)	P
B	Carpinus betulus L.	.	.	.	1.2	1.2	+.2	1.2	.	.	.	.	.	.	.	.	4	Gemasskont	P
C	Aegopodium podagraria L.	.	.	.	+.1	+.1	+.1	+.1	.	.	.	.	.	.	.	.	4	Euras(kont) (smed)	H,G
C	Cruciata glabra (L.) Ehrend.	.	.	.	+.1	+.1	+.1	+.1	.	.	.	.	.	.	.	.	4	Smed(gemasskont)	H
C	Primula vulgaris Hudson	.	.	.	1.1	1.1	+.1	+.1	.	.	.	.	.	.	.	.	4	Smed-atl	H
C	Stellaria holostea L.	.	.	.	1.2	1.1	.	.	.	.	.	.	.	.	.	.	2	Eurassubozean(-smed)	Ch
C	Sanicula europea L.	.	.	.	1.1	1.1	.	.	.	.	.	.	.	.	.	.	2	Subatl(-smed)	H,C
C	Luzula pilosa (L.) Willd.	.	.	.	+.2	+.2	.	.	.	.	.	.	.	.	.	.	2	No-eurassubozean	H
C	Festuca heterophylla Lam.	.	.	.	+.2	1.2	.	.	.	.	.	.	.	.	.	.	2	Smed-gemasskont	H
C	Melica nutans L.	.	.	.	+.2	+.2	.	.	.	.	.	.	.	.	.	.	2	No-euras(kont)	H(G)
C	Galium schultesi Vest.	.	.	.	.	.	+.1	+.1	.	.	.	.	.	.	.	.	2	Gemasskont	G
C	Asarum europaeum L.	.	.	.	.	.	+.1	+.1	.	.	.	.	.	.	.	.	2	Euraskont	H,G
C	Carex sylvatica Hudson	.	.	.	.	.	+.1	+.2	.	.	.	.	.	.	.	.	2	Subatl(-smed)	H
	Char.& Differ. species of the Ass. *Seslerio autumnalis-Fagetum sylvaticae* and All. *Seslerio-Fagion sylvaticae* (Syn.: *Fagion moesiacae* Blečić et Lakušić 1970)																		
C	Lathyrus venetus (Miller) Woh.	.	.	.	.	.	+.1	.	+.2	1.2	.	.	.	.	.	.	3	S.E.&S.C.Eur	G(H)

C	Epipactis latifolia All.	.	.	.	.	.	.	.	1.1	1.1	.	.	.	.	+.1	.	3	Euras(subozean)-smed	G
B	Chamaecytisus hirsutus (L:) Li.	.	.	.	.	.	.	.	+.2	+.2	.	.	.	.	.	.	2	S.E.Eur	Pn
B	Cotinus coggygria Scop.	.	.	.	.	.	.	.	+.2	1.2	.	.	.	.	.	.	2	Osmed	P
B	Evonimus verrucosus Scop.	.	.	.	.	.	.	.	+.2	1.2	.	.	.	.	.	.	2	ES.E.Eur	P
B	Ostrya carpinifolia Scop.	.	.	.	.	.	.	.	+.2	1.2	.	.	.	.	.	.	2	Osmed	P
C	Convallaria mayalis L.	.	.	.	.	.	.	.	1.1	1.1	.	.	.	.	.	.	2	Eurassubozean(no)	G
C	Solidago virgaurea L.	.	.	.	.	.	.	.	1.1	+.1	.	.	.	.	.	.	2	Euras(subozean)-smed	H
C	Salvia glutinosa L.	.	.	.	.	.	.	.	+.1	+.1	.	.	.	.	.	.	2	Pralp	H
	Char.& Differ. species of the Ass. *Lathyro verni-Fagetum sylvaticae* and All. *Seslerio-Fagion sylvaticae*																		
C	Cardamine bulbifera (L.) Cr.	.	.	.	+.1	.	.	.	.	.	1.1	+.1	1.1	+.1	+.1	+.1	7	Gemasskont-osmed (-pral)	G
B	Rhamnus fallax Boiss.	.	.	.	.	.	.	.	.	.	+.1	+.1	+.2	+.2	1.2	1.2	6	Balc	P
C	Cardamine enneaphyllos (L.) Cr.	.	.	.	.	.	.	.	.	.	+.1	1.1	1.1	1.1	1.1	1.1	6	Opralp	G
B	Acer pseudoplatanus L.	.	.	.	.	.	.	.	.	.	+.1	+.1	+.1	+.1	.	.	4	Subatl-smed(-pralp)	P
C	Caradamine bulbifera (L.) Cr.	.	.	.	+.1	.	.	.	.	.	1.1	+.1	1.1	+.1	+.1	+.1	7	Gemasskont-osmed (-pralp)	G
C	Melica uniflora Retz.	.	.	.	.	.	.	.	.	.	+.2	+.2	1.2	1.2	.	.	4	Subatl-(smed)	H(G)
C	Galium odoratum (L.) Scop.	.	.	.	.	.	.	.	.	.	+.2	+.2	+.2	1.2	.	.	4	Eurassubozean-smed	G
C	Polygonatum multiflorum (L.) All.	.	.	.	.	.	.	.	.	.	+.1	1.1	+.1	1.1	.	.	4	Eurassubozean(-smed)	G
B	Evonymus latifolia (L.) All.	.	.	.	.	.	.	.	.	.	+.2	+.2	.	.	.	.	2	Pralp(-smed)	P
C	Galanthus nivalis L.	.	.	.	.	.	.	.	.	.	1.1	.	1.1	.	.	.	2	Pralp(-gemasskont)	G
C	Polygonatum verticillatum (L.) All.	.	.	.	.	.	.	.	.	.	.	+.1	.	+.1	.	.	2	Pralp-(nosubatl9	G
C	Isopyrum thalictroides L.	.	.	.	.	.	.	.	.	.	.	.	2.2	1.1	.	.	2	Euras(-smed)	G
C	Hordelymus europaeus (L.)C.O.	.	.	.	.	.	.	.	.	.	.	.	+.2	1.2	.	.	2	Gemasskont-smed	H
C	Corydalis cava (L.) Schw.&K.	.	.	.	.	.	.	.	.	.	+.1	.	+.1	.	.	.	2	Gemaskont	G
C	Scilla bifolia L.	.	.	.	.	.	.	.	.	.	+.1	.	+.1	.	.	.	2	Smed(-gemasskont)	G
C	Arum maculatum L.	.	.	.	.	.	.	.	.	.	.	.	+.1	+.1	.	.	2	Subatl(-smed)	G
C	Polystichum lobatum (Hudson) Ch.	.	.	.	.	.	.	.	.	.	.	.	+.2	1.2	.	.	2	Eurassubozean	H
C	Calamintha sylvatica Bromf.	.	.	.	.	.	.	.	.	.	.	.	+.1	+.1	.	.	2	Smed(-subatl)	H
C	Lilium martagon L.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	.	.	1	Euras(kont)(-smed)	G
	Char.& Differ. species of the Ass. *Phyteumo spicatae-Fagetum* and All. *Seslerio-Fagion sylvaticae*																		
B	Lonicera alpigena L.	.	.	.	.	.	.	.	.	.	.	.		+.1	+.2	+.2	3	Alp-pralp	P
C	Cystopteris montana (Lam.) Desv.	.	.	.	.	.	.	.	.	.	.	.	.	.	+.2	+.2	2	Arctalp(subozean)circ	G(H)
C	Luzula sylvatica (Hudson) Gaudin	.	.	.	.	.	.	.	.	.	.	.	.	.	+.2	+.2	2	Subatl(-smed)	H
C	Adenostyls alliariae (Gouan) A. Kerner	.	.	.	.	.	.	.	.	.	.	.	.	.	+.2	+.2	2	Alp-pralp	H
C	Actea spicata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+.2	+.2	2	(No)-eurassubozean	G
C	Geranium macrorhizum L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	+.2	2	Opralp	H(Ch)
	The species of the orders *Quercetalia pubescentis* Klika 1933 1932 and *Fagetalia sylvaticae* Pawl. In Pawl. et al. 1928 and class *Querco-Fagetea* Br.-Bl. & Vlieger in Vlieger 1937																		
A	Fagus sylvatica L.	.	.	.	+.1	1.1	+.1	1.2	4.4	4.4	5.5	5.5	5.5	5.5	4.4	5.5	12	Balc	P
B	Fagus sylvatica L.	.	.	.		+.2	+.2	1.2	2.2	1.2	2.2	3.2	2.2	3.2	2.2	2.2	11	Balc	P
C	Aremonia egrimonioides (L.) DC	+.1	+.1	+.1	1.1	1.1	1.1	1.1	.	.	.	.	+.1	1.1	+.1	+.1	11	Osmed	H
C	Viola reichenbachiana Jo. ex Bo.	.	.	.	+.1	1.1	+.1	+.1	.	.	.+.1	+.1	+.1	1.1	+.1	+.1	10	Subatl-smed	H
B	Rosa arvensis Hud.	+.2	1.2	1.2	+.2	+.2	+.2	+.1	+.2	1.2	.	.	.	.	.	.	9	Subatl-smed	P
C	Anemone nemorosa L.	.	.	.	1.2	+.1	+.1	+.1	.	.	+.2	+.2	1.1	+.1	+.2	.	9	Eurassubozean	G
A	Quercus petraea (Matt.) Liebel.	3.3	3.3	3.3	1.1	1.2	1.1	1.1	+.1	.	.	.	.	.	.	.	8	Subatl-smed	P
C	Helleborus odorus Waldrt.& Kit.	+.1	1.1	1.1	1.1	1.1	1.1	1.1	.	.	+.1	.	.	.	.	.	8	Balc	G(H)
C	Fragaria vesca L.	+.1	+.1	+.1	+.1	1.1	.	.	+.1	+.2	.	.	.	.	.	.	8	No-euras(subozean)	H
C	Sesleria autumnalis (Scop.)	2.2	2.2	1.2	.	.	+.1	+.2	3.3	3.3	.	.	.	.	.	.	7	Balc-apen	H
C	Potentilla micrantha Ram. In DC.	+.1	1.1	1.1	+.1	+.1	+.1	.	.	.	+.1	.	.	.	.	.	7	Smed	H
C	Clinopodium vulgare L.	+.1	1.1	1.1	.	+.2	+.1	.	1.1	1.1	.	.	.	.	.	.	7	Euras-smed	H
B	Quercus petraea (Matt.) Liebel.	2.2	2.2	1.2	.	+.1	+.2	1.1	.	.	.	.	.	.	.	.	6	Subatl-smed	P
B	Pyrus pyraster Burgds.	+.1	+.1	+.1	+.1	+.1	+.1	.	.	.	.	.	.	.	.	.	6	Smed(gemasskont)	P
C	Lathyrus niger (L.) Bernh.	1.1	+.1	+.1	+.1	+.1	.	+.1	.	.	.	.	.	.	.	.	6	(O)smed-gemasskont	G(H)
C	Veronica chamaedrys L.	+.2	1.1	1.1	+.1	1.1	.	.	.	.	.	.	.	+.2	.	.	6	No-eurassubozean	Ch
C	Dactylis hispanica Rothm	+.2	1.2	1.2	.	+.2	.	+.2	.	.	+.2	.	.	.	.	.	6	Med-smed	H
C	Euphorbia amygdaloides L.	+.1	.	.	+.1	+.1	.	+.1	+.1	+.1	.	.	.	.	.	.	6	Subatl-smed	Ch
B	Acer campestre L.	.	.	.	.	+.2	+.1	+.1	1.1	+.1	+.1	.	.	.	.	.	6	Subatl-smed	H
C	Asplenium adiantum-nigrum L.	+.2	1.2	+.2	.	.	.	.	.	.	.	.	.	+.2	.	+.2	5	Subatl-smed	H

B	Cornus mas L.	.	.	.	.	+.1	+.1	.	+.2	+.2	.	.	.	.	.	.	4	Osmed	P
A	Acer pseudoplatanus L.	.	.	.	.	.	.	.	.+.2	+.1	.	.	+.1	+.1	.	.	4	Subatl-smed(pralp)	P
C	Hieracium prenanthoides Vill.	.	+.1	.	.	+.1	.	.	+.1	+.1	.	.	.	.	.	.	4	(Pralp)alp-arct(-no)	H
C	Peucedanum oreoselinum (L.) Mo.	.	+.2	+.1	.	+.1	.	.	.	+.1	.	.	.	.	.	.	4	Gemasskont(-smed) med	H
C	Campanula trachelium L.	.	+.1	.	.	.	.	.	+.1	+.1	+.1	.	.	.	.	.	4	Eurassubozean-smed	H
C	Melittis melissophyllum L.	.	.	.	.	+.1	.	.	+.1	1.1	.	+.1		.	.	.	4	Smed	H
B	Clematis vitalba L.	.	.	.	.	.	.	.	+.2	+.2	+.2	.	.	.	.	.	3	Smed-subatl(circ)	P
B	Corylus avellana L.	.	.	.	.	.	.	.	+.2	1.2	+.2	.	.	.	.	.	3	Eurassubozean	P
B	Cornus sanguinea L.	.	.	.	+.1	.	.	.	+.1	+.2	.	.	.	.	.	.	3	Smed(-subatl)	P
C	Hieracium murorum Hudson	+.1	+.1	.	.	.	.	.	+.1	.	.	.	.	.	.	.	3	No-eurassubozean	H
C	Geum urbanum L.	.	.	.	.	+.1	.	.	.	.	.	.	.	+.1	+.1	.	3	Eurassubozean-smed	H
C	Symphytum tuberosum L.	.	.	.	.	.	+.2	+.2	.	.	.	.	.	+.2	.	.	3	Gemasskont-smed	G
C	Arabis hirsuta (L.) Scop.	.	+.1	+.1	.	.	.	.	.	.	.	.	.	.	.	.	2	Euras-smed,circ	H(T)
C	Lathyrus venetus (L.) Bernh	.	.	.	.	+.1	.	.	.	.	.	+.1	.	.	.	.	2	Gemasskont	G(H)
C	Mycelis muralis (L.) Dumort	.	.	.	.	.	+.1	.	.	.	.	.	+.1	.	.	.	2	Subatl-smed	H
C	Epilobium montanum L.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	+.1	.	2	(no)eurassubozean	H(Ch)
C	Viola alba Besser	+.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	Med-smed	H
B	Prunus avium L.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	Subatl-smed	P
B	Acer platanoides L.	.	.	.	.	+.1	.	.	.	.	.	.	.	.	.	.	1	Gemasskont	P
B	Viburnum opulus L.	.	.	.	.	.	+.1	.	.	.	.	.	.	.	.	.	1	Euras(subozean)	P
B	Lonicera xylosteum L.	.	.	.	.	.	.	.	+.2	.	.	.	.	.	.	.	1	Subatl-smed	P
C	Melampyrum nemorosum L.	.	.	.	.	.	.	.	+.2	.	.	.	.	.	.	.	1	Gemasskont(-smed)	H
C	Lamiastrum galeobdolon (L.) Eh.&P.	.	.	.	.	.	.	.	.	.	.	.	.	+.2	.	.	1	Gemasskont	Ch
C	Ajuga reptans L.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	.	.	1	Subatl-smed	H
C	Crocus vernus (L.) Hill	.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	.	1	Opralp(-smed)	G
	The other species:																		
C	Asplenium trichomanes L.	+.2	+.2	+.2	.	+.1	.	.	.	.	.	.	.	+.2	.	.	5	(No)euras-smed,circ	H
C	Prunella vulgaris L.	.	+.1	.	1.1	1.2	+.1	.	.	.	.	.	.	.	.	.	4	(No)euras	H
C	Prunella laciniata (L.) L.	+.2	+.1	+.1	.	.	.	.	.	.	.	.	.	.	.	.	3	Smed	H
C	Thymus serpyllum L.	+.2	1.2	1.2	.	.	.	.	.	.	.	.	.	.	.	.	3	Europkont	Ch
C	Achillea nobilis L.	.	+.1	+.1	.	.	.	.	.	.	.	.	.	.	.	.	2	Smed-euraskont	H
C	Trifolium rubens L.	.	+.1	+.1	.	.	.	.	.	.	.	.	.	.	.	.	2	Gemasskont-smed	H
D	Ctenidium molluscum (Hedw.) Mitt.	.	.	.	.	.	1.3	1.3	.	.	.	.	.	.	.	.	2	Circumbor	Ch
C	Astragalus glycyphyllos L.	.	.	.	.	.	.	.	+.2	+.2	.	.	.	.	.	.	2	Eurassubozean-smed	H
C	Urtica dioica L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+.2	+.2	2	No-euras	H
C	Asperula purpurea (L.) Ehrend.	.	+.2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	Balc	H
C	Lotus corniculatus L. f. ciliatus Koch	.	+.1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	Eurassubozean(-smed)	H
C	Hypericum perforatum L.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	Eurassubozean-smed	H
C	Sedum acre L.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	(No-)eurassubozean-smed	Ch
C	Cerastium caespitosum Gilib.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	No-euras(subozean)	Ch(T)
C	Helianthemum rupifragum	.	.	+.2	.	.	.	.	.	.	.	.	.	.	.	.	1	Din	Ch
C	Primula columnae Ten.	.	.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	1	S.E.Eur.	H
C	Vicia sepium L.	.	.	.	+.1	.	.	.	.	.	.	.	.	.	.	.	1	Eurassubozean	H
C	Lapsana communis L	.	.	.	.	+.1	.	.	.	.	.	.	.	.	.	.	1	Eurassubozean-smed	T(H)
C	Viola hirta L.	.	.	.	.	+.1	.	.	.	.	.	.	.	.	.	.	1	Euras-smed	H
C	Cruciata laevipes Opiz	.	.	.	.	.	+.2	.	.	.	.	.	.	.	.	.	1	Smed-eurassubozean	H
C	Astrantia major L.	.	.	.	.	.	.	+.1	.	.	.	.	.	.	.	.	1	(O)pralp	H
C	Lathyrus pratensis L.	.	.	.	.	.	.	.	+.1	.	.	.	.	.	.	.	1	Euras(subozean)-smed	H
C	Geranium robertianum L.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	.	.	1	Eurassubozean-smed	H(T)
C	Veratrum album L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+.1	.	1	Pralp	H

Abbreviations: A - The species of the tree stratum; B - The species of the scrub stratum hrub stratum; C - The species of harbs stratum; D - The mosses stratum

Q.p-c- Quercetum petraeae-cerris; Q-Cb qc - Querco-Carpinetum bertuli quercetosum cerris; L-Fm- Lathyro verni-Fagetum sylvaticae

S-F.s. - Seslerio autumnalis-Fagetum sylvaticae*; *P-F.s. - Phyteumo spicatae-Fagetum sylvaticae

The community *Quercetum petraeae-cerris* is one special phytogeographycal feature found on North Montenegro mountains and in area of continental Dinaric Alps (Lakušić, 1987; Čarni et al., 2009).

By floristic composition mentioned community showes certain level of similarity with Q*uercetum cerris „montanum"* B. Jovanović (1960) 1979 from the moesian province (Jovanović, 1980), and to termophilic variants of the community *Quercetum " montanum illyricum"* (Stefanović & Popović, 1961, Stefanović, 1964; 1984; Redžić & Golić, 1984; Redžić, 1989)).

Going to the south and southeast direction the association *Quercetum petraeae – cerris* is banded with the association *Lathyro nigeri-Quercetum cerris nomen nov hoc loco* (Syn.: *Quercetum cerris „mediterraneo-montanum"* Lakušić & Kutleša 1977), accomplishing an ecological continuum. In northwest is linked with the association *Orno – Quercetum cerris* Stefanović 1968.

The degradation of durmast and Turkey oak forestes directs to development of various progradation – degradation stages.

One of the most prominent is community *Aceri – Carpinetum orientalis* Blečić & Lakušić 1966, which inhabits shallow soils and warmer habitats. This association is particularly well developed in area toward river Neretva valley, and on the lower positions of Crvanj Mt.

On colder habitats the asssociation *Quercetum petraeae – cerris* accomplishes syndinamical bond with certain variants of the association *Seslerio autumnalis – Ostryetum carpinifoliae* Horvat & Horvatić 1958.On colder habitats, on dolomite geological foundation, it is bonded with thermophilic beech forests *Seslerio autumnalis – Fagetum* Blečić i & Lakušić 1970.

Order: *FAGETALIA SYLVATICAE* Pawlowski in Pawlowski & al. 1928
Alliance: *Erythronio-Carpinion betuli* (Horvat 1958) Marinček in Mucina et al. 1993
Ass.: *Querco-Carpinetum betuli* Horvat 1938 emend Blečić 1958 subass. *quercetosum cerris* Stefanović 1964 *aposeriosum foetidae* facies nov.(Nomenclature type: Releve 4, Tab.1; Diagnostic species: *Aposeris foetida, Primula vulgaris*)

The southern border of distribution of *Querco-Carpinetum betuli* assotiation is on Crvanj Mt. It is developed within durmast and Turkey oak forest zone.

The characteristic species of association are: *Quercus petraea, Carpinus betulus, Acer campestre, Pyrus pyraster, Primula vulgaris, Stellaria holostea, Melica nutans, Lathyrus venetus, Sanicula europaea* and *Aposeris foetida*.

Species of wider ecological/coenological range of tolerance, but important for defining of coenology status, are: *Aremonia agrimonioides, Helleborus odorus, Viola reichenbachiana, Anemone nemorosa, Veronica chamaedrys* and other (Tab. 1).

The high level of similarity the association achieves with subassociation *Q.-C.b. quercetosum cerris* Stefanović 1961 (Stefanović, 1964; Stefanović & Manuševa, 1971; Horvat & al., 1974; Redžić & al., 1986; Lakušić & al., 1987) especially with its facies *aposeriosum foetidae*. The syndinamical link of oak-hornbeam forests with mountain beech forests in this area has been accomplished through this facies.

Alliance: ***Seslerio-Fagion sylvaticae*** *Nomen nov hoc loco*
(Syn.: *Fagion moesiacae* Blečić & Lakušić)
Ass.: ***Lathyro verni-Fagetum sylvaticae*** Redžić 2007
(Ass.: *Fagetum moesiacae montanum* Blečić & Lakušić 1970)

The widest vegetation belt on vertical profile of Crvanj Mt. is build of complex of beech communities.

The very large area is covered by specific variant of mountain beech forest wich is developed on limestone foundation or silicate in series with limestone. Type of soil on habitats of mentioned community is calcocambisol, acified calcocambisol or calcomelanosol, which is recorded on more sloping terrain. Remarkable influence of sub-Mediterranean climate caused significant shifting of community towards higher altitudes, up to 1400 (1500) m on Crvanj.

In phytogeographycal sense, development of mentioned comminity associates Crvanj Mt. with group of northwestern and central Dinaric Alps.

Predominant role in community has species *Fagus sylvatica*, somewhere accompanied by *Acer pseudoplatanus*. Next group of species has high valuable role in coenodiagnostic: *Euonymus latifolius, Rhamnus fallax, Cardamine bulbifera, Galium odoratum, Polygonatum multiflorum, P. verticillatum, Galanthus nivalis, Scilla bifolia, Hordelymus europaeus, Corydalis cava* and other (Tab. 1).

The typical beech-fir forests structure (developed on adjacent mountain Visočica, Bjelašnica (Fukarek & Stefanović, 1958; Fukarek, 1979, Lakušić & al., 1984; 1987) Treskavica (Mišić, 1984) in the north and Gatačka Bjelašnica in the southeast) are not recorded on investigated profile Ulog-Jezero-Zimomor.

Abies alba is not or it is very rarely present in beech forest here.

However, the presence of *Rhamnus fallax, Lonicera alpigena, Galium odoratum, Polystichum lobatum, Cardamine enneaphyllos, Polygonatum verticillatum* and *Lilium martagon* species indicates development of certain beech-fir forests variant, or forests of beech and buckthorn (*Rhamno-Fagetum* Fukarek 1969), which are more common for group of south Dinaric Alps (Fukarek, 1979). One of possible reason for *Abies alba* absence could be intensive cutting in the past period, when fir is entirely but artificially removed from investigated habitats. According to literature sources, fir was distinctively more presented in this area (Murbeck, 1891).

Ass.: ***Seslerio autumnalis-Fagetum sylvaticae*** Blečić & Lakušić 1970 corr. hoc loco

The termophylic community of beech and autumn bluegrass (*Sesleria autumnalis*) is developed within belt of mountain and high mountains beech forests, but on warmer habitats, dolomite geological foundation and rendzine as type of soil. Habitats of mentioned community are situated on south aspect and terrain with inclination of 35º.

In floristic composition of community the next group of species has significant diagnostic and indicator value: *Sesleria autumnalis, Ostrya carpinifolia, Cotinus coggigria, Chamaecytisus hirsutus, Epipactis latifolia, Solidago virgaaurea, Canvallaria mayalis* and *Lathyrus venetus* (Tab. 1).

The community of autumn bleugrass with beech, within area with Illyrian climate is developed both in sub-Mediterranean belt (Horvat, 1962; Trinajstić, 2008), and deeply in continental hinterland, what is more often orographically and pedologically caused (Fukarek, 1979; Redžić, 1990).

Usualy, mentioned community is affiliated to littoral and south part of Central Dinaric mountains (Lakušić, 1987, Lakušić & al., 1984, 1987). Going to group of continental and northwestern Dinaric Alps, the community constitute the continuum to the *Seslerio autumnalis-Fagetum* (Horvat 1938) Horvat & al. 1974, which is developed in a few variants.

One of known community variants is *Seslerio autumnalis-Fagetum* (Horvat 1950) M. Wraber (1958) 1960, developed from the sub-Mediterranean to the subalpine area of Slovenia, and recently diffrentiated in several syntaxonomical categories (Dakskobler, 1991).

The thermophilic community of beech with autumn bluegrass in comparision with typical association *Seslerio-Fagetum sylvaticae*, recorded in south and southeastern part of central Dinaric Alps (Blečić, 1958; Blečić & Lakušić, 1970; Lakušić & Redžić, 1989) is rather poor in endemic species.

Species *Chamaecytisus tommasinii, Campanula lingulata, Dianthus sylvestris, Laserpitium marginatum, Trifolium pignattii, Crocus tommasinianus, Dioscorea balcanica, Daphne oleoides* and other endemic species are absent. By this finding, researched community is more similar to *Seslerio-Fagetum* in floristic sense.

Ass.: ***Phyteumo spicatae-Fagetum sylvaticae*** Barudanović 2003
(=Aceri-Fagetum subalpinum Fukarek & Stefanović 1958 emend Fukarek 1969)

The community of maple with subalpine beech is usualy recorded on mountains of northwestern and continental group of Dinaric Alps (Horvat, 1962; Fukarek, 1979; Redžić & al., 1984; Barudanović, 2003; Barudanović & Redžić, 2007).

In the souheast group of Dinaric Alps it is altered with community *Aceri visianii-Fagetum sylvaticae* Fukarek 1969 (Blečić 1958 – Syn.: *Fagetum subalpinum aceretosum visianii* Blečić 1958).

In the past period community of subalpine beech on Crvanj Mt. suffered extremely high level of antopogenic influence with purpose of subalpine pastures area enlargement.

The floristic analysis of researched sites situated on limestone foundation and calcomelanosol type of soil, at the altitude between 1500 an 1700 m, indicates the presence of this association, but in extremely poor form.

In the tree stratum, high cca 6 m, beech is predominant, but sycamore maple is also present. In schrub stratum *Lonicera alpigena* and *Rhamnus fallax* are only recorded species.

Characteristic and differential species of *Aceri-Fagetum* association here are: *Cystopteris montana, Luzula sylvatica, Adenostyles alliariae, Actea spicata, Geranium macrorhizum* and *Cardamine enneaphyllos*. Important diagnostic species of the order and class are: *Viola reichenbachiana, Aremonia agrimonioides, Anemone nemorosa, Crocus vernus, Geum urbanum* and other (Tab. 1).

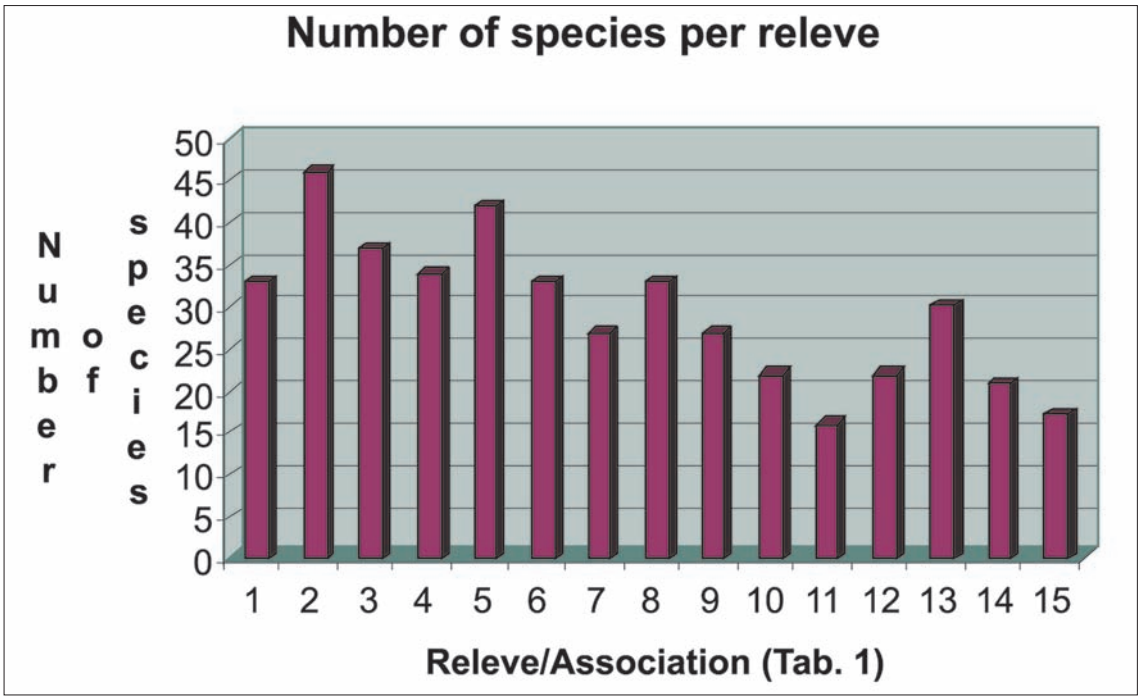
The belt of mountain pine on researched profile of Crvanj Mt. is completely absent. Terminal forest border is built up of subalpine beech community. Mountain pine community was developed on this profile (Murbeck, 1891), but during the past is completely destroyed to.

The analysis of floral elements spectrum – *Analiza spektra flornih elemenata*

In the structure of forest vegetation 135 plant species have been found (Graph 1). The richest is thermophillos community *Quercetum petraeae-cerris* and *Querco-Carpinetum*. Going to colder habitats in higher position number of plant species has decreasing tendency (Graph 1).

The 14 categories of floral elements have been found in floristic composition of forest communities on the Crvanj Mt. (Tab. 2).

To Dinaric floral element belongs only one species found in the association *Quercetum petraeae-cerris.* Species of Balkan floral element are present in all asso-



Graph 1. Number of plant species of the forest communites of Crvanj Mt.
Grafikon 1 Broj vrsta biljaka u zajednicama šuma Crvanj planine

ciations with interval of 5 % (*Quercetum petraeae-cerris)* to the 10 % (*Phyteumo-Fagetum*). Species of south-European distribution are dominant in the ass. *Seslerio-Fagetum sylvaticae*.

The presence of these floral elements shows the significant difference in comparision to forest communities from of Euroasian wide area (Korotkov & al., 1990; Rodwell & al., 1991; Wallnofer & al., 1993; Solomakha, 1966).

Table 2. Floral elements spectrum
Tablica 2 Spektar flornih elemenata

No	**Floral elements**	**No of species**	**Proportion (%)**
1	Alps-pralp-arctics	4	2.96
2	Balcans	6	4.44
3	Circumboreals	1	0.74
4	Dinarics	1	0.74
5	SE Europas	5	3.70
6	Euroassian-submediterranean	15	11.11
7	Euroassian-subocenics	19	14.07
8	Euroassian-submediterranean	5	3.70
9	Continentals	18	13.34
10	Mediterraneans	2	1.48
11	Submediterraneans	19	14.07
12	Subatlantics	19	14.07
13	NE -euroassiacs	11	8.16
14	Prealpines	10	7.42
	Total:	**135**	**100**

The species with subalpine floral element show significant increasing in spectrum, with increase of altitude.They are most abundant in the association of subalpine beech forests (29 %). Similar relations have been found in species of Euroasiatic-suboceanic floral element. With decrease of altitude, number of species of northeastern-Euroasiatic and sub-Mediterranean floral element increases. Sub-Atlantic floral elements is most abundant in mountain beech forests.

The analisys of floral elements spectrum as well as other investigated parameters show intermediate character of beech forest communities developed on Crvanj Mt. in re-

lation to communities of alliances *Aremonio-Fagion* and *Seslerio-Fagion.*

However, significant presence of species with Balkan and sub-Meditettanean floral element leads to positioning of these forests within other communities of *Seslerio-Fagion* alliance (Tab. 2).

Analysis of life forms spectrum – *Analiza spektra životnih formi*

Comparative analysis of the life forms spectrum (Tab. 3) show the significant decrease of phanerophytes with increase of altitude. Most of the analyzed associations have high level of hemicryptophyte-phanerophitic species presence, what is caused by influence of temperate continental climate (Redžić & Barudanović, 1991; Redžić & al., 1987; Redžić, 1988).

Table 3. Plant life form spectrum
Tablica 3 Spektar životnih formi biljaka

Plant life form	Number of species	Proportion (%)
P – Phanerophytae	33	24.44
Ch – Chamaephytae	10	7.41
H – Hemicryptophytae	64	47.41
G – Geophytae	27	20.00
T – Therophytae	1	0.74
Total:	**135**	**100**

Ass. *Seslerio-Fagetum* has phanerophyte-hemicryptophytic character, what is expression of polidominant structure and relict character of community. The community *Aceri-Fagetum* has hemicryptophyte-geophytic character, what indicates relatively high level of air humidity during the vegetation period, as well as unfavourable thermic conditions of habitat (Tab. 3).

CONCLUSION – Zaključak

Forest vegetation of Crvanj Mt. has broadleaved character. In the hilly belt forest with *Quercus petraea* and *Quercus cerris* are dominant. However, in mountain and subalpine vegetation belt *Fagus sylvatica* dominate. In phytocoenological sense, researched forests belong to *Querco-Fagetea* Class and act as important part of beech forests diversity on Dinaric Alps.

Special value, both for local and regional biodiversity, have communities of *Quercion petraeae- cerris* alliance, as well as endemorelicts *Aceri-Fagetum* and *Seslerio autumnalis-Fagetum sylvaticae.*

According to EUNIS habitat classification, researched communities are developed on habitats with special value for conservation of European biodiversity. On Crvanj Mt.are habitats of many rare, endemic and treathened species such as *Helleborus multifidus, Helleborus purpurascens, Iris graminea, Ostrya carpinifolia, Corylus colurna, Rhamnus fallax, Sesleria autumnalis, Galanthus nivalis, Convallaria maialis* and other important species for biodiversity Dinaric and European wide area.

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SAŽETAK: Istraživani su obrasci bioraznolikosti zajednica šumske vegetacije na vertikalnom profilu planine Crvanj u Hercegovini (od Uloga do Zimomora – vrha planine Crvanj). Šumska vegetacija predstavljena je sa sljedećim zajednicama: Quercetum petraeae-cerris *B. Jovanović (1960) 1979 subas.* seslerietosum autumnalis *subas. nova;* Lathyro nigeri-Quercetum cerris *nomen nov hoc loco (Syn.:* Quercetum petraeae-cerris "mediterraneo-montanum" *Lakušić et Kutleša 1977,* Aceri-Carpinetum orientalis *Blečić et Lakušić 1966 iz sveze* Quercion petraeae-cerris *[(Lakušić 1976) Lakušić et Jovanović 1980] Čarni et al. 2009 i* Carpinion orientalis *Blečić et Lakušić 1966;* Querco-Carpinetum betuli *Horvat 1938 emend Blečić 1958 subas.* quercetosum cerris *Stefanović 1964* aposeriosum foetidae *facies nov. iz sveze* Erythronio-Carpinion betuli *(Horvat 1958) Marinček in Mucina et al. 1993;* Lathyro verni-Fagetum sylvaticae *Redžić 2007 nom. nov (Syn.:* Fagetum moesiacae montanum *Blečić et Lakušić 1970),* Seslerio autumnalis-Fagetum sylvaticae *Blečić et Lakušić 1970 corr. hoc loco i* Phyteumo spicatae-Fagetum sylvaticae *Barudanović 2003 corr. hoc loco (Syn.:* Aceri-Fagetum subalpinum *Fukarek et Stefanović 1958 emend Fukarek 1969) (alliance* Seslerio-Fagion *Nomen nov hoc loco (Syn.:* Fagion moesiacae *Blečić et Lakušić 1970). Sve biljne zajednice su hemikriptofitsko-fanerofitskog karaktera sa značajnim učešćem geofita. Balkanski, dinarski i jugoistočno-evropski florni elementi značajno diferenciraju ove zajednice od srodnih šumskih zajednica drugih područja Dinarida.*

K l j u č n e r i j e č i : Balkan, Crvanj planina, Hercegovina, Querco-Fagetea, Sintaksonomija, Šumska vegetacija